

Going to Bat *for* Bats

Why these remarkable winged mammals deserve more public support and scientific study. By Tom Dickson

It's not easy being a bat. The winged mammals have long been reviled as symbols of evil and witchcraft. Bats are feared for their silent, erratic nighttime flight, otherworldly appearance, and mysterious movements to and from underground roosts. Bats have been accused of attacking people, drinking human blood, and spreading rabies. Even scientific journals often depict bats open-mouthed in what appear to be menacing shrieks.

Yet the poor public image of bats may be the least of their problems. Bats must survive the loss of large trees and other roosting sites, disturbances by vandals, and lung damage caused by wind turbines. To make matters worse, they now face the threat of a mysterious disease wiping out colonies in northeastern states—and spreading west.

Given all they are up against, it's surprising to learn that bats are among the world's most successful species. "Bats are physiological marvels," says Bryce Maxell, interim director of the Montana Natural Heritage Program. Bats are the world's only flying mammals (flying squirrels, Maxell explains, only soar as they fall). Like grizzly bears, bats hibernate, and, like whales, deploy sophisticated sonar to navigate and find food. Because they occupy an ecological niche—the night sky—that other mammals and most birds don't fully use, bats have multiplied and evolved over the past 50 million years to become among the most abundant and diverse animals on the planet. ▶▶

SILENT SLURPER Bats drink on the wing, skimming over the water surface while taking a quick sip. Bats that live in Montana's arid regions, such as the pallid bat shown here, must constantly replace vast amounts of water lost to evaporation from the surface of their wings.

PHOTO BY JOE MCDONALD

Bats are characterized by their serrated wings, which resemble bits of broken umbrella. Oversized hands with flat, flexible finger bones make up the main wing structure. (Bats' scientific order name, Chiroptera, is Latin for "hand wing.") Attached to the fingers, arms, and body is a thin, elastic skin membrane that also connects the legs to the tail. In flight, most bats feed by snatching insects in their mouth, though some use a wing or the tail membrane like a baseball mitt to nab prey in midair. Their fluttering flight—which gave rise to the notion that bats are crazy, or "batty"—comes from the animals' attempts to catch flying insects.

Contrary to myth, bats see well, but they navigate at night with a sophisticated sense of hearing. Bats have evolved to thrive in darkness, most likely to avoid hawks and other daytime raptors. They produce a constant stream of high-frequency calls from their vocal chords at decibel levels equal to a jet engine's. "Bats seem quiet, but they are actually making a huge racket we can't detect because we don't hear the high frequency sounds they emit," says Maxell. With its large and highly developed ears, a bat picks up sound waves bouncing back off a bridge abutment or spruce bud moth and then—based on the time it takes for the sound to return—determines the object's lo-

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cation and, for flying insects, the direction and speed of movement.

Though they look somewhat like flying mice, bats are not rodents and are more closely related to shrews and moles. Of the roughly 1,000 bat species worldwide, 15 occur in Montana. Some, like the Townsend's big-eared bat, reside here year round, while others migrate south to warmer states and Mexico each fall.

When not flying, bats roost in caves and attics, under bridges, in rock outcrops, and between the loose bark and trunk of old, large trees. They hang upside down—"like rows of old rags," wrote one poet—with toes hooked into cracks, high above predators. Bats use many different sites: day roosts for sleeping, night roosts for resting and digesting prey, female maternity roosts for rearing young, and winter roosts (or hibernacula) during cold months.

Ruined roosts

Despite their remarkable biological adaptations, bats quickly die out when their roosts

are degraded or destroyed. While bats gain habitat from new bridges, mines, and buildings, they lose roosts whenever abandoned mines are sealed, old homes are torn down, or large trees are logged or burned. "Some roosts support colonies that have lived there for decades," says Maxell. "When the roosts are wrecked, bats may have a tough time finding another suitable site." For instance, wintering bats use caves and caverns where temperatures remain just above freezing. "Anything colder and they freeze to death," Maxell says. "Anything warmer causes them to burn fat reserves, and they basically starve during winter."

Human disturbance also can ruin bat roosts. Experienced recreational cave explorers, known as cavers, avoid bothering bats and help protect cave environments. But some caves, caverns, and mines attract vandals who light fires, set off fireworks, and paint graffiti on walls. Bats permanently leave roosts and avoid sites that have too much commotion.

Wind turbines can be deadly to bats, primarily tree-roosting species such as the

silver-haired bat and hoary bat. The animals apparently die of lung damage after being sucked into a low-pressure area immediately behind the blades—a condition known as barotrauma. A study in 2006-07 estimated that more than 1,200 bats were killed during fall and spring migrations at a 90-turbine wind farm near Judith Gap. Another area with possible high bat mortality is along the Rocky Mountain Front in southern Alberta, home to thousands of wind turbines.

A new threat to Montana bats may be white-nose syndrome (see sidebar, page 14), which has wiped out colonies in New York and other eastern states. The disease is so devastating that biologists predict the Northeast's population of little brown bats could become extinct within the next 20 years. Though white-nose syndrome may never reach the Rockies, biologists throughout the West have begun bracing for its arrival. "We're hoping for the best but preparing for the worst," says Kristi DuBois, Montana Fish, Wildlife & Parks wildlife biologist in Missoula.

Because bats produce litters of only one to two pups per year, "if something happens to a colony or population, it can take a long time to recover," says Paul Hendricks, Montana Natural Heritage Program zoologist. Pregnant and nursing Townsend's big-eared bats hang out in small, dense colonies in Montana's relatively small number of warm cave

and cavern environments such as Lewis and Clark Caverns. That makes them especially vulnerable to roost loss, disturbances, and disease.

Fewer bats would result in far more insect pests damaging crops, ruining picnics, and spreading disease. In just one night, a single little brown bat will eat 4,000 mosquitoes that, besides annoying campers, can carry West Nile Virus. Maxell notes that bats also help control insect pests in western Montana forests and the Flathead Valley fruit-producing region.

Learning a little

The scientific information that wildlife biologists need to help bats is in short supply. Especially lacking are locations of roosting sites for the state's four species of concern: spotted bat, fringed myotis, eastern red bat, and Townsend's big-eared bat. "Very few caves in Montana have been inventoried, and we're only now learning to what extent bats roost in

rock outcrops, in talus slopes, and under bridges," says Hendricks. "We don't even know what roosting habitats to protect."

Bats are tough to study. They hide deep in crevices, fly at night, and produce calls mostly inaudible to humans. For years biologists had only a sketchy sense of bat distribution in Montana. That began to change in the 1990s when new ultrasonic technology allowed scientists to decipher bat calls. Researchers deploy the Anabat and Sonabat echolocation systems to record ultrasonic bat



CAVE VISITORS Experienced cavers protect caves, disinfect their clothing and equipment to avoid spreading white-nose syndrome, and take pains to avoid bothering bats. Cave vandals, on the other hand, ruin bat roosts with graffiti, fire building, and other disturbances.

BATS in the mainstream

Bat folklore has long been associated with the supernatural and, starting in the 19th century, the vampire Dracula. Bats are also the mascot of Gotham City's famous superhero. Only by overcoming his childhood fear of bats was the Caped Crusader able to summon the courage to fight evildoers intent on destroying the world. Listed here are other examples of bats in the mainstream:



The U.S. Postal Service released its American bats stamp series in 2002. The set featured a red bat, pallid bat, spotted bat, and leaf-nosed bat.



Congress Bridge in Austin, Texas, is home to 1.5 million Mexican free-tailed bats. Each year 100,000 tourists gather to watch the bats emerge at dusk to feed.

LEFT TO RIGHT: 365THINGS/AUSTEN.COM; USPS; NBC; AUSTRALIANBATCLINIC.COM/AU

Rob Mies, director of the Organization for Bat Conservation, captivates late night TV host Conan O'Brien with a tame fruit bat.



Fruit bats rescued during severe storms in early 2011 by the Australian Bat Clinic became an international Internet sensation when photos of them went viral. Wrote one blogger: "Who knew bats could be adorable?"



sounds. These are then translated by computers into low-frequency chirps, burrs, and chatters audible to humans. In addition to identifying species, the technology allows experts to see what bats are doing, such as when the animals make a “feeding buzz” while locating and eating prey.

Biologists also capture bats along streams and at cave and abandoned mine entrances using tiny-mesh nets. Hendricks and other researchers put up the “mist nets” at dusk and leave them standing for a few hours. They measure each captured bat and determine its age, sex, and reproductive status. “Netting tells us where bats are at night, but even more important is figuring out where they are roosting during the day,” says Hendricks. “That requires fitting bats with transmitters and following them with radiotelemetry equipment.” Because the equipment is expensive, he adds, very little radiotelemetry work has been done on Montana bats.

Despite a chronic lack of funding, some bat conservation work is taking place. Hendricks and other bat advocates credit the U.S. Forest Service, Bureau of Land Management (BLM), and U.S. Army Corp of Engineers for

“Bats are shy animals that try to avoid contact with humans whenever possible.”

funding several bat surveys in caves and at hydropower dams. The Forest Service, BLM, and Confederated Salish and Kootenai Tribes have also installed “bat gates” at several abandoned mine entrances to restrict vandalism while allowing bats in and out. Maxell says he’s heartened by new research showing that altering wind turbine operations during high-risk periods for bats significantly reduces fatalities. “We’re hoping turbine owners will be open to making some minor modifications that will save bats—like reducing windpower production during summer in low-wind conditions when bats may be active in the area,” Maxell says.

DuBois says one way ordinary people are helping bats is by protecting big trees and snags, especially those near water. “Another is by telling friends and family that bats are

interesting and there’s absolutely no need to be afraid of them,” she says.

Loving what we understand

Yet fear of bats persists. Over the centuries the animals’ silent, nocturnal habitats, fluttering flight, and odd appearance have spawned numerous unfavorable myths and legends. Shrouded in mystery, the cave dwellers are depicted in folklore and popular fiction as symbols of death, the underworld, and vampires. “People fear things they don’t understand, and it’s hard to learn about something that moves around silently in the dark,” says DuBois. She has found that people are less afraid once they learn a few basic facts. For instance, many photographs show bats with their mouth wide open, teeth exposed. “That’s usually because they’re in

BLADE RUNNERS Bats can die while, for reasons unknown, they chase the spinning blades of wind turbines. The rapid change in air pressure behind the blades causes blood capillaries in a bat’s lungs to explode—a condition known as barotrauma.



USDOE

1. KRISTI DUBOIS; 2. ROBERT J. WESELMANN; 3. MERLIN D. TUTTLE, BAT CONSERVATION INTERNATIONAL (BCI); 4. ROBERT J. WESELMANN; 5. BCI; 6. BCI; 7. WES UNCAPHER; 8. BCI; 9. JOE McDONALD; 10. BCI; 11. BCI



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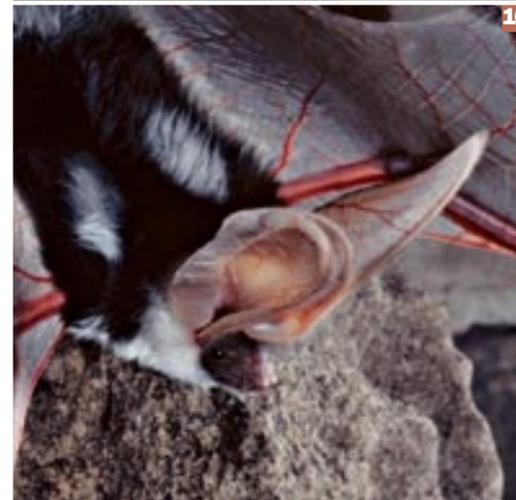


AMAZING FACES A bat uses its oversized ears to gather ultrasonic calls bouncing back off objects. Ear shapes differ based on the echolocation methods each species employs. For instance, the spotted bat (10) is a moth eater that uses sound frequencies lower than what the insects can detect. To hear its calls for navigation, spotted bats evolved to have bigger ears than many other species. Says Merlin Tuttle, founder of Texas-based Bat Conservation International: “If you think about it, bats are no stranger looking than elephants. But we are familiar with elephants, so we like them anyway.”

Montana bats shown here: Townsend’s big-eared bat (1), big brown bat (2), western small-footed myotis (3), silver-haired bat (4), eastern red bat (5), California myotis (6), long-legged myotis (7), hoary bat (8), pallid bat (9), spotted bat (10), long-eared myotis (11).

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Learn more about bats

- ▶ **Bat Conservation International**
Information on bat natural history as well as bat house construction plans, bats in buildings, bats and rabies, and a video with instructions on how to safely remove a bat from your home: batcon.org/
- ▶ **Montana State University**
Information on bats in homes: http://animalrangeextension.montana.edu/articles/wildlife/Bats_Montguide.pdf
- ▶ **Montana Fish, Wildlife & Parks**
Living with Wildlife: fwp.mt.gov/wildthings/livingWithWildlife/

someone's hand and are scared to death," explains DuBois. As for the myth that bats fly into people's hair, DuBois points out that bats are shy animals "that try to avoid contact with humans whenever possible. Besides, why would any animal want to fly into someone's hair?"

As for rabies, the Montana Department of Public Health and Human Services says bats pose a human health risk, but a small one. Less than one-half of 1 percent of wild bats carry the disease—a prevalence far lower than in skunks and foxes. In 40 years of surveying bats, Hendricks says he has been nipped only once, "by a bat I'd grabbed that was only trying to defend itself." He adds that he'd been previously vaccinated against rabies, a routine precaution taken by scientists who handle bats. According to the Centers for Disease Control, the best way for regular folks to be safe around bats is simple: Never touch one.

Bats occasionally cause problems. They sometimes roost in attics—warm, dry, dark environments that are ideal bat habitat. Homeowners sometimes hear bats moving and squeaking, and accumulated excrement and urine from large colonies can smell.

Even with their sullied reputation, bats may be getting a public makeover. DuBois notes that increasingly she hears from people who want bats removed from their house but left unharmed. "That's a big difference

“ Kids aren't freaked out anymore. They say, 'We want to see bats. Bats are cool.' ”

from 20 years ago," she says. "I think people are learning that bats are important Montana wildlife, like elk and eagles." Tom Forwood, naturalist at Lewis and Clark Caverns State Park, says bat education programs in schools have changed attitudes. "Kids aren't freaked out anymore. They say, 'We want to see bats. Bats are cool.'"

DuBois notes that few people these days

still believe bats attack people and suck human blood. In fact, many homeowners in Montana and elsewhere now put up outdoor bat houses to attract the mosquito eaters. Bats have even become tourist attractions. A bridge in Austin, Texas, is the summer home of a colony of 1.5 million bats. Each year roughly 100,000 tourists visit the bridge at dusk to watch the bats leave the roost to feed.

BAT TRACKERS Using mist nets (right), scientists capture bats that are identified and measured before release. Acoustic monitoring stations installed along streams (far right) record bat calls for later study. Though touching bats is discouraged by health officials, researchers take safety precautions such as routine rabies vaccinations.



MERLIN D. TUTTLE, BAT CONSERVATION INTERNATIONAL



MONTANA NATURAL HERITAGE PROJECT

Bats will never replace grizzly bears, bison, or cutthroat trout on Montana's tourism brochures. And a state chapter of Myotis Unlimited won't be opening anytime soon. Yet bats may find plenty of support here. Montanans have a reputation for valuing and conserving wildlife of all types. If there's anyone able to learn about, support, and conserve these shy, fascinating, and unfairly maligned critters, it's us. 🦇

See live bats at the Second Annual Bat Week, August 15-20, at Lewis and Clark Caverns State Park. Events include daily programs and nighttime bat tours of the caverns. Appropriate for families with kids age five and older. For more information, call the park at (406) 287-3541.



MORE BAT FANS Populations of some Montana species like this Townsend's big-eared bat may be declining, though scientists say the lack of information makes it hard to tell for certain. One thing in bats' favor is growing public interest in bat behavior. Says one FWP state parks naturalist, "In the past seven or eight years I've noticed a real change in attitudes about bats, especially in kids."

JOE McDONALD

Stay safe around bats

Like all mammals, bats can carry rabies, though relatively few do. Still, health officials say it's not wise to take chances:

- ▶ Never handle a live or dead bat.
- ▶ Stay away from any bat that appears sick or is on the ground during daylight.
- ▶ If a bat accidentally gets into your house, leave doors and windows open so it can eventually fly out.

JESSE LEE VARRIADO

Red Flags Raised over White-Nose Syndrome

In 2006 a caver in upstate New York was puzzled to find dozens of dead little brown bats, each with a white fungus on its nose. Since then, what is being called white-nose syndrome (WNS) has spread to 16 states and three Canadian provinces, killing more than one million bats. Bat colonies in the Northeast have declined by more than 70 percent, and many scientists predict the little brown bat will be regionally extinct by 2030.

Because the epidemic has arrived so

suddenly, scientists are still figuring out exactly how the syndrome kills bats. One theory is that because the fungus seems to cause skin irritation, bats wake from their winter torpor more often than usual, burning up precious fat reserves and starving to death before insects emerge in spring. The fungus may also weaken bats' immune system, affect their blood pressure, or be outright lethal to the animals.

In 2010 the fun-



USFWS

gus was documented in Oklahoma, a jump westward of several hundred miles from confirmed locations. That led scientists to suspect the fungus was carried on the clothing of someone who had explored an infected cave then traveled west.

In Montana, representatives of state and federal agencies say they continue to monitor the spread of WNS and discuss ways to prevent it from infecting bats in the Northern Rockies. The U.S. Forest Service recently announced it will soon fund bat distribution surveys and training sessions on how to decontaminate clothing and equipment before and after cave and mine entry.

To give bats a fighting chance, state and federal conservation agencies are asking people not to disturb the ani-

mals when roosting. The Forest Service has issued caving equipment decontamination orders and recently announced the possibility of a permit-only entry system for national forest caves in Montana and other states.

Lewis and Clark Caverns State Park now requires visitors who have entered caves east of the Mississippi River within the past four years not to wear clothing or carry items from those visits into the caverns.

Chris Servheen, regional U.S. Fish and Wildlife Service coordinator for WNS, says the measures are meant to keep the fungus out of Montana and other western states and protect bats from unnecessary stress. ■



Wildlife biologists in Maine survey a cave for white-nose syndrome, which is wiping out bat colonies throughout the Northeast.

JONATHAN MANS, MAINE DEPT. OF INLAND FISHERIES AND WILDLIFE